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Maritimes Region | Science Response 2017/039

STOCK STATUS UPDATE OF LOBSTER (*HOMARUS AMERICANUS*) IN THE BAY OF FUNDY (LOBSTER FISHING AREAS 35-38)

Context

Advice on the stock status of American Lobster (lobster) in Lobster Fishing Areas (LFAs) 35-38 is requested annually by Fisheries and Aquaculture Management (FAM). The last Regional Advisory Process of this stock occurred in February 2013 (DFO 2013, Gaudette et al. 2014, Tremblay et al. 2013), with updates occurring since 2014 (DFO 2014, 2016, 2017). The 2013 assessment identified three primary indicators that describe changes in lobster abundance and biomass, as well as proposed reference points for each indicator. This Science Response updates these indicators to the end of the 2015-16 fishing season.

This Science Response Report results from the Science Response Process of June 26, 2017, on the 2017 Stock Status Update of American Lobster in Lobster Fishing Areas (LFAs) 35-38.

Background

Description of the Fishery

Commercial lobster fishing in LFAs 35-38 occurs in the Bay of Fundy (Figure 1) and borders the two biggest lobster fisheries in the Northwest Atlantic: LFA 34, which has the highest landings near 30,000 tonnes (mt) (DFO 2016) and the most participants of any LFA in Canada, and Downeast Maine (Hancock and Washington counties), with annual landings averaging approximately 30,000 mt since 2012 (DMR 2017). Landings in LFAs 35-38 began a long-term increase in the mid-1990s, and current landings are at record highs. This increase in landings occurred in most of the Gulf of Maine regions as well as many other lobster stocks in Atlantic Canada.

The fishery is managed by input controls including a minimum legal size (MLS, 82.5 mm carapace length (CL)), prohibition on landing of both egg-bearing and V-notched (with no setal hairs) females, limited entry, fishing seasons and trap limits. Fishing seasons and traps limits differ among LFAs (Table 1). Other management measures include the requirement of vents to allow sublegal sized lobster to escape and biodegradable trap mechanisms to mitigate ghost fishing by lost traps.

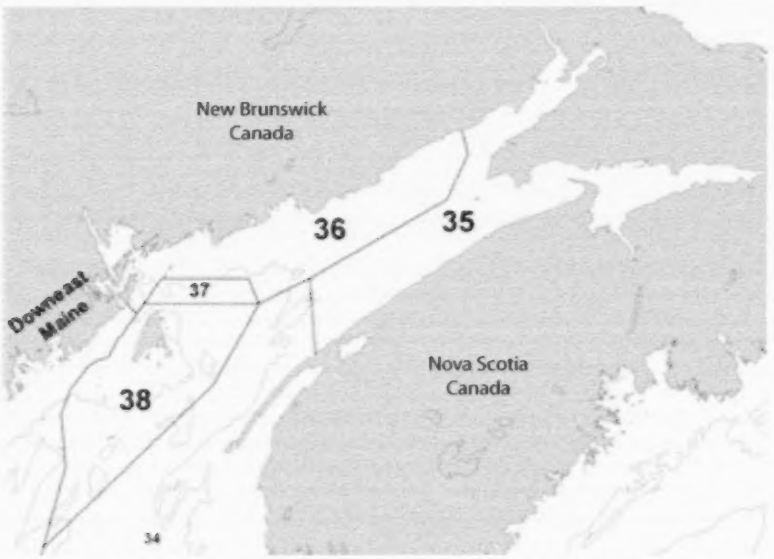


Figure 1. Lobster Fishing Areas (LFA) 35-38 in the Bay of Fundy. Lobster Fishing Area 37 is a shared fishing area between LFAs 36 and 38.

Table 1. Number of total licences, trap limits and fishing seasons for each LFA within the Bay of Fundy. Note that LFA 37 is a shared fishing area where fishers from LFAs 36 and 38 are authorized by licence condition to fish.

LFA	Licences*	Traps Limits	Fishing Year
35	95	300	*Fall:* *Oct. 14th – Dec. 31st* *Spring:* *Last day Feb. – July 31st*
36	177	300	*Fall:* *2nd Tuesday in Nov. – Dec. 31st* *Spring:* *March 31st – June 29th*
38	136	375	*2nd Tuesday in Nov. – June 29th*

* as of January 28, 2013 (see Tremblay et al. 2013 for the different categories)

Analysis and Response

The LFA 35-38 assessment (DFO 2013, Gaudette et al. 2014, Tremblay et al. 2013) provided a full analysis of stock health by describing fishery performance and providing indicators for abundance and biomass, fishing pressure and reproduction. Spatial variation of these indicators was evaluated. Three primary indicators were identified and reference points were tabled. The rationale for these indicators was documented at a Maritimes Region Science Advisory Meeting in 2012 (DFO 2012). The first biomass indicator was based on landings. It was recognized that using landings as the sole indicator of lobster stock status has risks, and one of the goals of the 2013 assessment (DFO 2013) was to provide potential alternatives. Two additional stock indicators and associated Upper Stock References (USR) points that relate to abundance or biomass were proposed and have subsequently been adopted but without Limit Reference Points (LRP) set yet. Commercial catch rate, calculated as total landings/total trap hauls in LFAs 35-38 from complete logbook records, related to the abundance of the legal portion of the stock. The other indicator related to population abundance and was based on the stratified mean of number of lobsters per tow in a fishery-independent trawl survey (DFO

Summer Research Vessel [RV] Survey). For each indicator, a 3-year running mean of the index was used to compare to the USR. The status of these indicators and USR are provided below.

Landings and Catch Rate

An upward trend in landings was recorded for the past 2 decades (1994-1995 to 2015-2016) in all 3 LFAs, and 2015-2016 landings are the highest on record for the Bay of Fundy at 12,873 mt (Figure 2). Compared to the previous year, landings decreased (6.5%) in LFA 35 and increased in LFAs 36 (4%) and 38 (13%). Despite this decrease, landings in LFA 35 are the third highest on record. The USR and LRP for the biomass of legal lobsters based on landings is defined as 80% and 40% of the median for the period 1984-1985 to 2008-2009, which corresponds to 1,575 and 782 mt, respectively. For the fishing year 2015-2016, the 3-year running mean was at 12,206 mt, 7 times the USR. By this measure, the LFAs 35-38 lobster stock is considered to be in the Healthy Zone.

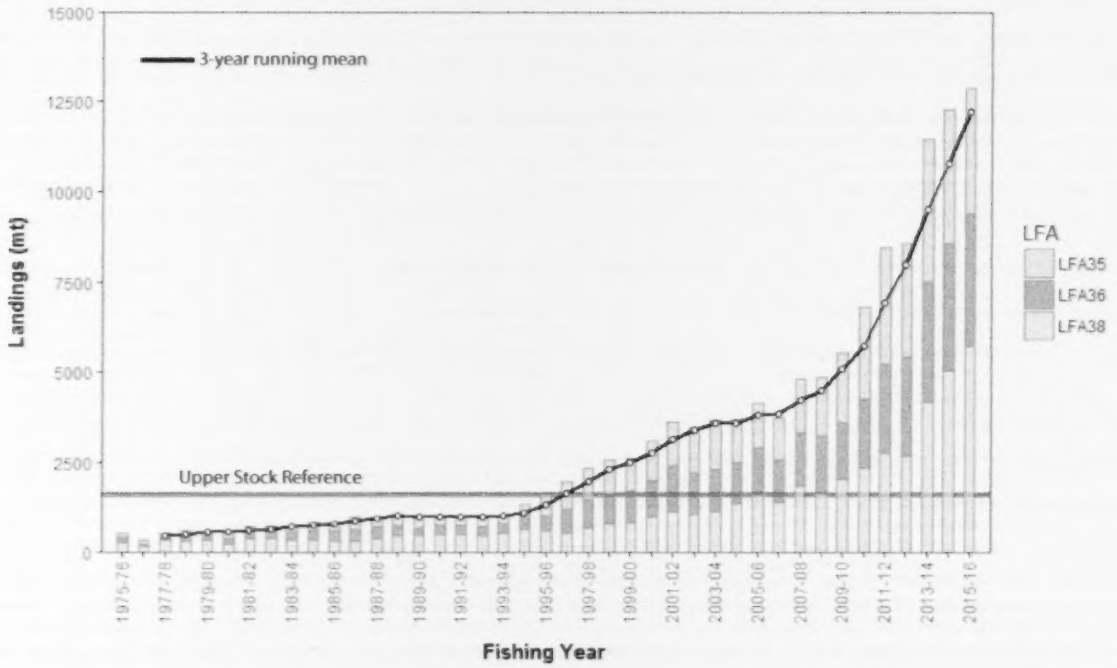
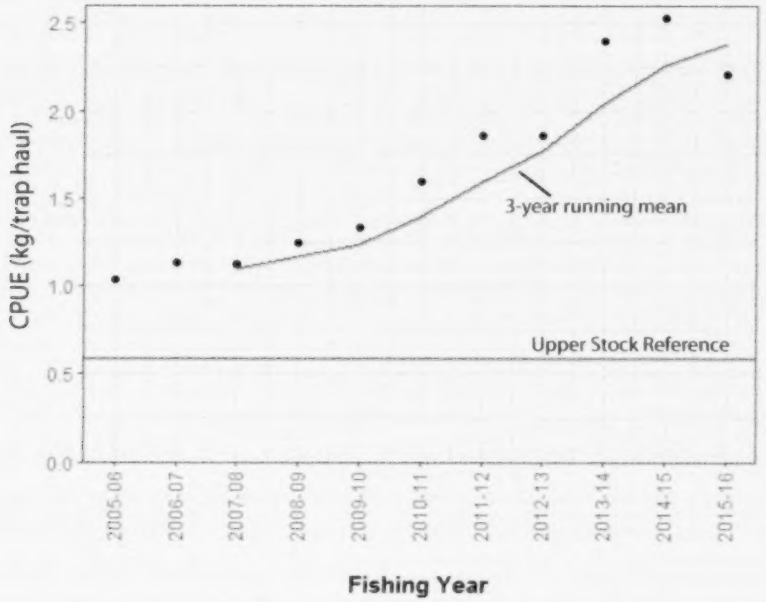


Figure 2. Lobster landings by fishing year from the commercial fishery in LFAs 35-38 from 1975 to summer 2014. Fishing year encompasses the fall through the early summer of the following year. The red line is the landing Upper Stock Reference for the LFAs 35-38 as a whole (1575 mt). The solid black line is the 3-year running mean for LFAs 35-38 landings.

The commercial catch-per-unit-effort (CPUE, in kg/trap haul) has increased since 1998-1999 and the 2.21 kg/trap haul for 2015-2016 is the third highest on record. The USR for the biomass of legal size lobsters based on the CPUE (0.58 kg/trap haul) is defined as 50% of the median for the reference period 2005-06 to 2008-09. The most recent 3-year running mean is 2.37 kg/trap haul, 4 times the USR (Figure 3).



Fgure 3. Trend in commercial Catch Per Unit Effort (CPUE; total weight landed/total trap hauls) per fishing year calculated from complete entries of fishermen logbooks. The horizontal dot-dashed red line (0.58 kg/trap haul) is the Upper Stock Reference. The green solid line is the 3-year running mean.

Fishery-independent Survey

The fishery-independent indicator proposed in the last assessment (DFO 2013) was based on stratified mean of lobster catch rate (number of lobsters/tow) from the DFO Summer RV Survey in strata 490-495 (Figure 4). In 2016, 24 tows were conducted in the area, 4 in each stratum. The USR for lobster abundance based on this survey was 80% of the median catch rate for the period 1985-2009, which correspond to 1.9 lobsters per tow. In 2016, the estimated 3-year running mean was 54.7 lobsters/tow, nearly 30 times greater than the USR (Figure 5). This survey does not sample in depths shallower than 50 metres in the Bay of Fundy, which are highly productive lobster areas. The observed annual variability in average catch rates is likely related to low sampling intensity.

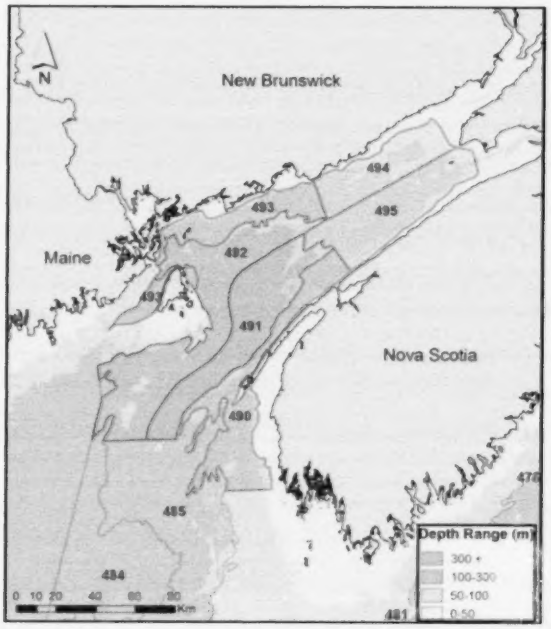


Figure 4. DFO Summer RV survey strata in NAFO Division 4X. Data compiled to assess lobster stock status in LFAs 35-38 are from strata 490 to 495 inclusively (n=6). In 2016, 4 tows were conducted in each stratum.

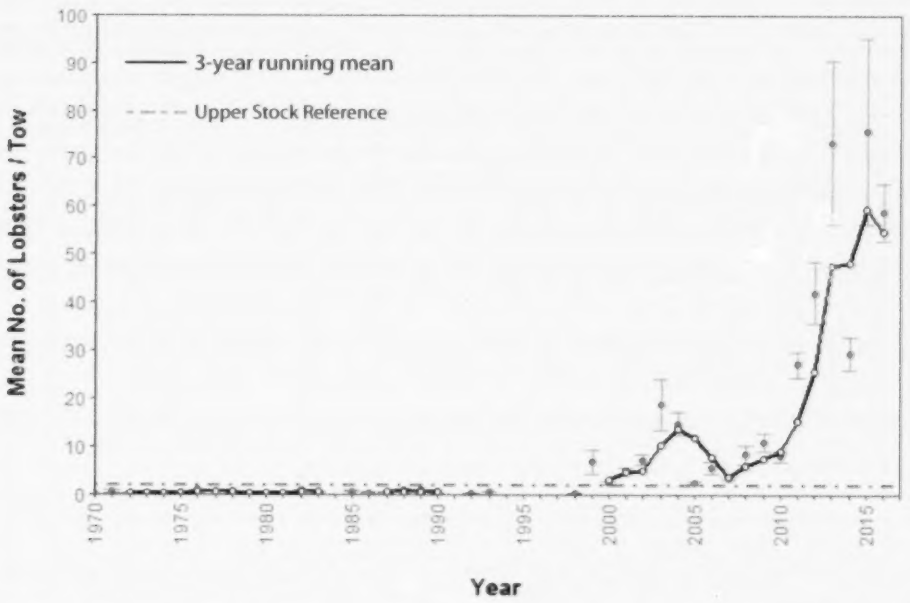


Figure 5. Stratified mean number of lobsters per tow (±Standard Error) in LFAs 35-38 from DFO Summer RV Survey (Strata 490-495) calculated as the area weighted average of the mean catch rates of the 6 strata within the Bay of Fundy. Solid black line is the 3-year running mean. Red dot-dashed line is the Upper Stock Reference (USR) set at 1.9 lobsters per tow. NB: Years with no symbols (e.g. 1994-1997) had no lobster counts available; lobster total weights were normally recorded but lobster counts were not estimated from those weights.

Conclusions

Based on 3 stock indicators (landings, commercial catch rate and DFO Summer RV Survey catch rate) the lobster stock in LFAs 35-38 was considered to be in the Healthy Zone at the end of the 2015-2016 fishing year. The 3-year running averages of these indicators were above the USRs.

Each of the stock indicators has strengths and weaknesses that were outlined in the previous assessment (DFO 2013). Given that all three are providing similar signals, there is confidence that overall abundance and biomass remain high relative to the 1994-2009 period. However, because size-at-50%-onset-maturity in the Bay of Fundy occurred at a large size (> 90 mm CL) while legal size is at 82.5 mm CL, the three primary indicators provided herein monitor a large segment of the immature population (Gaudette et al. 2014). Therefore, abundance trends presented here are not necessarily reflecting the broodstock status and are likely influenced by recruitment regimes.

Moving forward, monitoring broodstock abundance as a primary indicator would increase our ability to assess the reproductive status of the stock.

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Sources of Information

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